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ABSTRACT

The use of computer conferencing (CC) to support undergraduate distance learners will, presumably, lower attrition rates for distance learners by providing students with the ability to exchange ideas and develop insights with others, overcoming the intellectual and social isolation associated with correspondence courses. It will be years before the first students in the four-year baccalaureate programs at New York Institute of Technology are expected to graduate from these new CC-supported distance learning programs. It is far too early to compare retention rates. However, analysis can begin on the exchanges that are taking place among the teachers and students using CC to determine to what extent the system supports the distance learner in the way it was initially envisioned. The CC messages for six undergraduate distance learning courses involving a total of eight students were content-analyzed using the printouts from these courses. The courses ranged from psychology to history and physics and were completed eventually by four students (50 percent). In addition, the courses were analyzed with respect to high versus low teacher-provided structure and high versus low teacher behaviors encouraging student participation using a modification of the behavioral specifications employed by Peterson. The analysis showed a high degree of content-related messages from both students and mentors. Little message time was spent on questions related to system operation, indicating that students were comfortable with the format. Further research over time is needed to determine if CC can prevent dropouts and motivate students to continue distance courses. (KC)

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AN ANALYSIS OF COMPUTER CONFERENCES SUPPORTING THE DISTANCE LEARNER

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AN ANALYSIS OF COMPUTER CONFERENCES SUPPORTING THE DISTANCE LEARNER

Penelope J. Haile, Ph.D.

INTRODUCTION

Distance learning, as a format for adult education, is plagued with high attrition rates frequently associated with these programs. Completion rates for individual lessons hover around 55% (Lambert, 1984), with completion rates of certificate or degree programs presumably even lower. One innovative use of a new technology is being used for some degree programs for distance learners in an effort to increase retention and the ultimate success of the students.

This new technology, computer conferencing (cc), involves the ability to transmit messages over great distances via computer, telephone lines, and in some cases, satellites. Just a few years ago these messages were viewed as electronic telegrams, cryptic and curt. In the past few years, we have witnessed a great leap in the complexity and sophistication of the computer software which supports the most up-to-date computer messaging systems. These messaging systems, called computer conferencing (cc), permit a number of people to communicate extensively both verbally and graphically to one or to many, while providing a relatively permanent record of the transactions.

Computer conferencing presumably will lower attrition rates for distance learners by providing students with the ability to exchange ideas and develop insights with others, overcoming the intellectual and social isolation associated with correspondence courses. Students are able to ask questions of their teacher or other students as they are studying the material. The lag-time associated with the use of the postal system, which presumably inhibits the elaboration and exploration of ideas, will be greatly shortened with the use of cc, resulting in an interactive exchange of ideas. A second assumption made by distance learning programs using cc is that a social support system for and among the students will develop which will also contribute to a decrease in attrition rates.

It will be years before the first students in a 4-year baccalaureate programs are expected to graduate from these new cc-supported distance learning programs. It is far too early to compare retention rates. However, we can begin to analyze the exchanges that are taking place among the teachers and students using cc and determine to what extent the system supports the distance learner in the way it was

initially envisioned.

Two areas need to be explored in order to determine whether computer conferencing can be of benefit to the distant learner. On the one hand, we need to articulate the various reasons why the vast majority of distant learners do not complete their programs. On the other hand, the capabilities of cc need to be explored in an effort to identify those uses which will address the needs of students studying at a distance. To what extent can cc be used to convey classroom lectures? If cc can be used to transmit a teacher's lecture (sometimes called an "electure," short for an "electronic lecture"), is this an effective teaching technique? What other teaching techniques can be employed with cc? Are "class discussions" possible and, if so, are they effective? Can modelling be used to shape problem solving strategies?

Transcripts of 6 undergraduate distance learning courses have been analyzes with respect to high versus low teacher-provided structure and high versus low student participation using a modification of the behavioral specifications employed by Peterson (1977, 1979). In addition, the courses were content analyzed with respect to frequencies of 4 categories of messages: class management, technical assistance, motivational, and content-specific.

METHOD

The first 6 courses run in a degree program for distance learners were selected for analysis. All but one of the courses had only one student. The courses varied by discipline (e.g., physics, history), instructor, and level (introductory or upper level). Table I summarizes the characteristics of the 6 courses.

TABLE I

Characteristics of Courses Using Computer Conferencing

Course	Level	Mentor Rank	# of Students
World History I	introductory	Assistant Prof.	3
Survey of the Phys. Sciences	introductory	Asssociate Prof.	1
Technical Writing	upper level	Assistant Prof.	1
Introductory Psychology	introductory	Assistant Prof.	1
Educational Psychology	upper level	Assistant Prof.*	1
Child Psychology	upper level	Assistant Prof.*	1

*the same mentor taught these two courses

The 8 students enrolled in these 6 courses ranged in age from 20 to 45 years, with a mean of 32.3 years. Four of the students were female, 4 male. Of the 5 mentors, 2 were female and 3 male. The students were located thorough the United States and, in some cases, continued their active participation while on business trips.

For administrative purposes, the courses "ran" for 6 months. At the end of 6 months, the mentors submitted grades for the courses. In all but one case, the grade submitted was an Incomplete indicating that the course requirements were not completed by the student in the 6-month period. The one student who did complete the course within the first 6 months received a grade of B for World History I. Three of the other 7 students completed their courses with grades of A within the second 6 months; four received permanent grades of Incomplete. The completion rate for these 6 courses, then, is 50%.

STRUCTURES USED FOR COURSE CONFERENCES

The computer conferencing software used for the courses was developed by Participation Systems Inc. (Winchester, Massachusetts) in conjunction with New York Institute of Technology. The software is flexible enough to permit mentors to structure their courses in a variety of ways. A special "branching" feature allows for some or all members of a "conference" to go off on a tangent to discuss a related topic, while continuing the main discussion in the "trunk" conference.

Three structures were used to organize the courses. A simple, linear conference with no branches was employed by the mentors for the physics and one psychology course (see Structure A in Figure 1). Two psychology courses and the history course were structured using one branch, established by the mentor for homework assignments (see Structure B in Figure 1). The English course used the most complex structure which included the main trunk conference and 3 branches. The 3 branches were all established by the student in response to his needs relating to the course requirements. This student had logged almost 14 hours on the cc system as a student in a previous pilot course. Consequently, he was familiar with the advantages of branching and was knowledgeable about the commands used to open a branch.

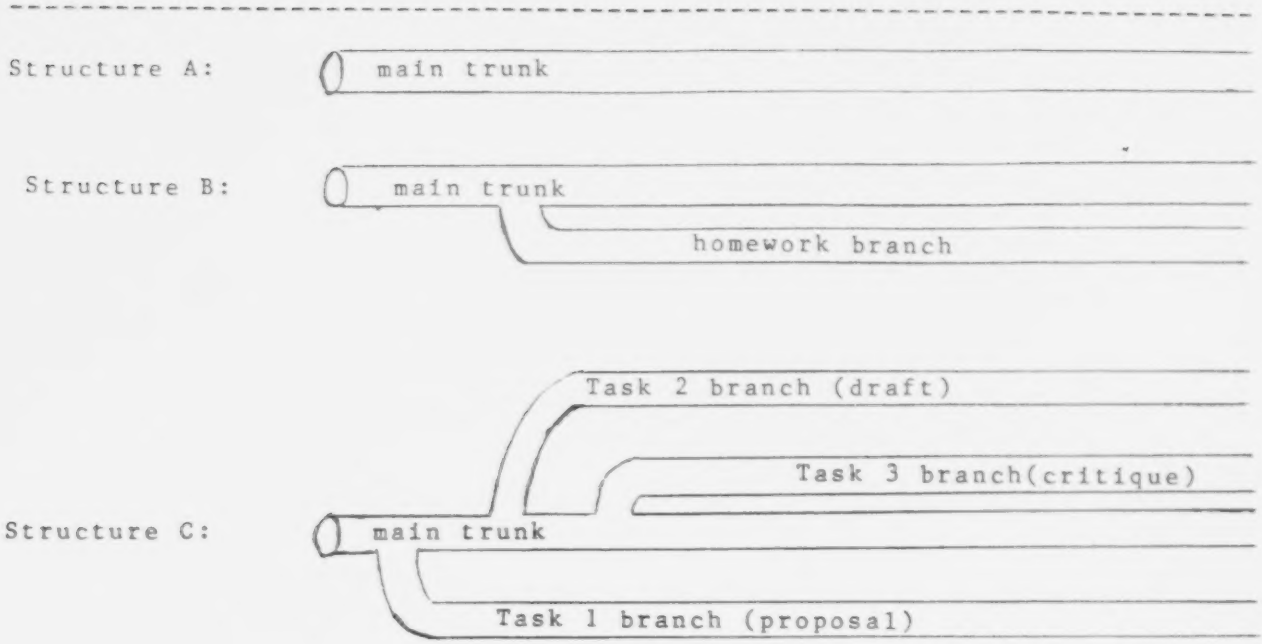

Figure 1. Structures of the computer conferences.

For 5 of the 6 courses, the students and mentors used other communication modes in addition to computer conferencing. These included the postal system, telephone, personal notes on the computer system, and one face-to-face meeting.

OVERVIEW OF MESSAGES

The total number of messages sent by the mentors equalled or exceeded those sent by the students for all courses except Technical Writing where the student sent more messages than did the mentor (see Table II).

TABLE II

Length of Conferencing Messages Between Students and Mentors

Course	Student Total	Student Mean Length (char.)	Mentor Total	Mentor Mean Length (char.)	Totals
World History I	13 (39)*	1732	17 (52)*	648	30(91)*
Survey of the P.S.	20	1889	20	1231	40
Technical Writing	47	608	26	718	73
Introductory Psych	32	1787	39	1114	71
Educational Psych	20	1423	27	73	47
Child Psych	7	1520	7	508	14

*total for course

It is interesting to note that the shortest average student message length occurred in the English writing course and the longest average student message length occurred in the physics course. The length of the mentor's messages was the highest in the Physics course also. Technical courses may require a good deal of verbal explanation in order to facilitate learning, which would explain the lengthy messages. Also, in order to type in formulas, many spaces are used which are included in the character count.

For half the courses, the mentors sent more messages than did the students, although in 5 of the 6 courses, the students responses were much longer than were the mentors' messages.

RESULTS OF CONTENT ANALYSIS

A content analysis was conducted on the computer printouts of the 6 distance learning courses. Four distinct categories of messages from both students and mentors were identified:

1. Class management/organization
2. Technical assistance with the computer system
3. Motivation/social climate
4. Course content (clarification, reinforcement, question, answer, and discussion)

Table III gives examples of each category. Some of the conference messages contained statements representing more than one category of message.

TABLE III

Examples of Categories of Messages Used in a Computer Conferencing Course

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CATEGORY 1: CLASS MANAGEMENT/ORGANIZATION

16 (of 31) AMENTOR Mar. 12, 1985 at 10:22 (2054 characters)

...However, I would like you to communicate to me on computer conferencing questions on topics that you have difficulty with before doing the homework. In this way I can see if you have a good grasp of the material before attempting the homework...

CATEGORY 2: TECHNICAL ASSISTANCE WITH THE SYSTEM

3 (of 25) AMENTOR Dec. 14, 1984 at 14:21 (1224 characters)

...Barbara please send messages to the Conference "2423D". This means that when you send a note, the command should be .S "2423D"...

CATEGORY 3: MOTIVATION/SOCIAL CLIMATE

39 (of 63) AMENTOR Aug. 16, 1985 at 14:21 (723 characters)

...I'm just back from a little vacation time--went backpacking with my 13 year old son in the White Mountains--and found your letter and resume assignment in my mail. The work is excellent and ...

CATEGORY 4: CONTENT-SPECIFIC

24 (of 74) ASTUDENT Jan. 16, 1985 at 12:14 (2003 characters)

...I found the article ambiguous. It seemed to me that Grunbaum was first refuting Popper and finding him "too dismissive" of Freud's theory and then...

All 4 message categories were used by both the students and the mentors, although the distributions of use were different. Categories 3 and 4 (motivation and content) were the most frequently occurring among the messages from both students and mentors. But while the mentors sent a higher proportion of Category 3 messages than did the students, the students sent a higher proportion of messages dealing with content (Category 4). Figure 2 shows the relative proportion of categories of messages sent by mentors and students.

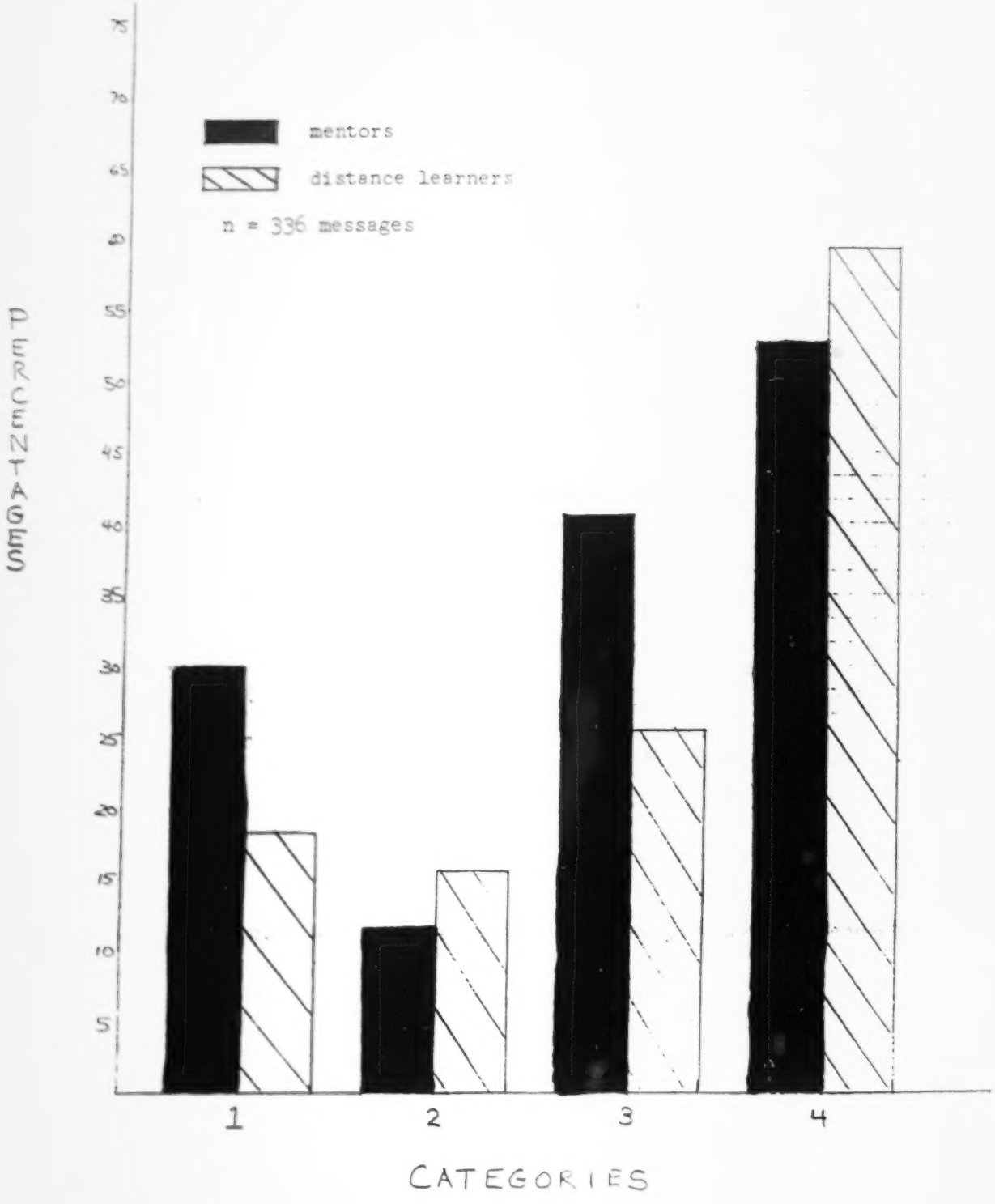

Figure 2: Use of Categories of Messages by Mentors and Students: Distance Learners

Clearly the intricacies of the system itself were not a primary focus of attention in these courses. Less than 15% of the total messages contained any reference to the system. In fact, a portion of these system-specific messages dealt with student questions about uploading files from disk, a highly sophisticated use of the system. Since the students owned their own computer equipment, they were, in some cases, more knowledgeable about technical issues than were some of the mentors. Even students who were computer novices at the start of a course, quickly expressed an interest in expanding and upgrading their own systems to include a printer, word processing software, etc.

Category 4, which includes content-specific messages, is of particular importance when describing the educational process in a computer conference. While class management and motivation are traditional, salient variables in pedagogy, it is the use of cc to enhance the learning process most directly which is of primary importance in any assessment of the role cc can play in post-secondary education.

The course conference messages in Category 4 were further classified into 4 subtopics:

1. Reinforcement: confirmation of correct understanding; review

2. Clarification: articulation of subtle differences in concepts; further refinement of a concept

3. Discussion: extended discourse on one topic or concept; application of concepts

4. Question: asking a specific question

5. Answer: answering a specific question

Examples of messages in each of these sub-topics are shown in Table IV.

TABLE IV

Examples of Types of Category 4 Messages

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1. REINFORCEMENT

   4 (of 67) AMENTOR Jan. 25, 1985 at 22:47 (933 characters)

   ...I am sure you noted with amusement that we thought so much of the postal system developed along with the roads of Persia that we have adopted their logo: neither snow,...

2. CLARIFICATION

   15 (of 31) ASTUDENT Mar. 6, 1985 at 1:23 (2530 characters)

   ...On module 10, one of the confusing items was the "reference point", it seemed to come up in questions 3, 14, and 17. In #4 I figured that...

3. DISCUSSION

   6 (of 66) ASTUDENT Dec. 14, 1984 at 0:51 (1188 characters)

   ...I really enjoyed chapter 3, particularly the critical discussion on working mothers. My first daughter was born in 1975. I was working...

4. QUESTION

   19 (of 20) ASTUDENT May 29, 1985 at 17:55 (724 characters)

   ...Is this a rule commonly suspended in the business of writing internal reports?

5. ANSWER

   20 (of 20) AMENTOR Jun 3, 1985 at 9:57 (829 characters)

   In answer to your question re sentence fragments, I see no reason to justify a run on or fragment owing to content and purpose. Sentences should...

Figure 3 shows the percentages of messages from mentors and students containing the 5 types of Category 4 statements. Mentors used some review and reinforcement statements in their messages but students never did. A high (58%) proportion of the mentors' messages contained statements which clarified course concepts. The student

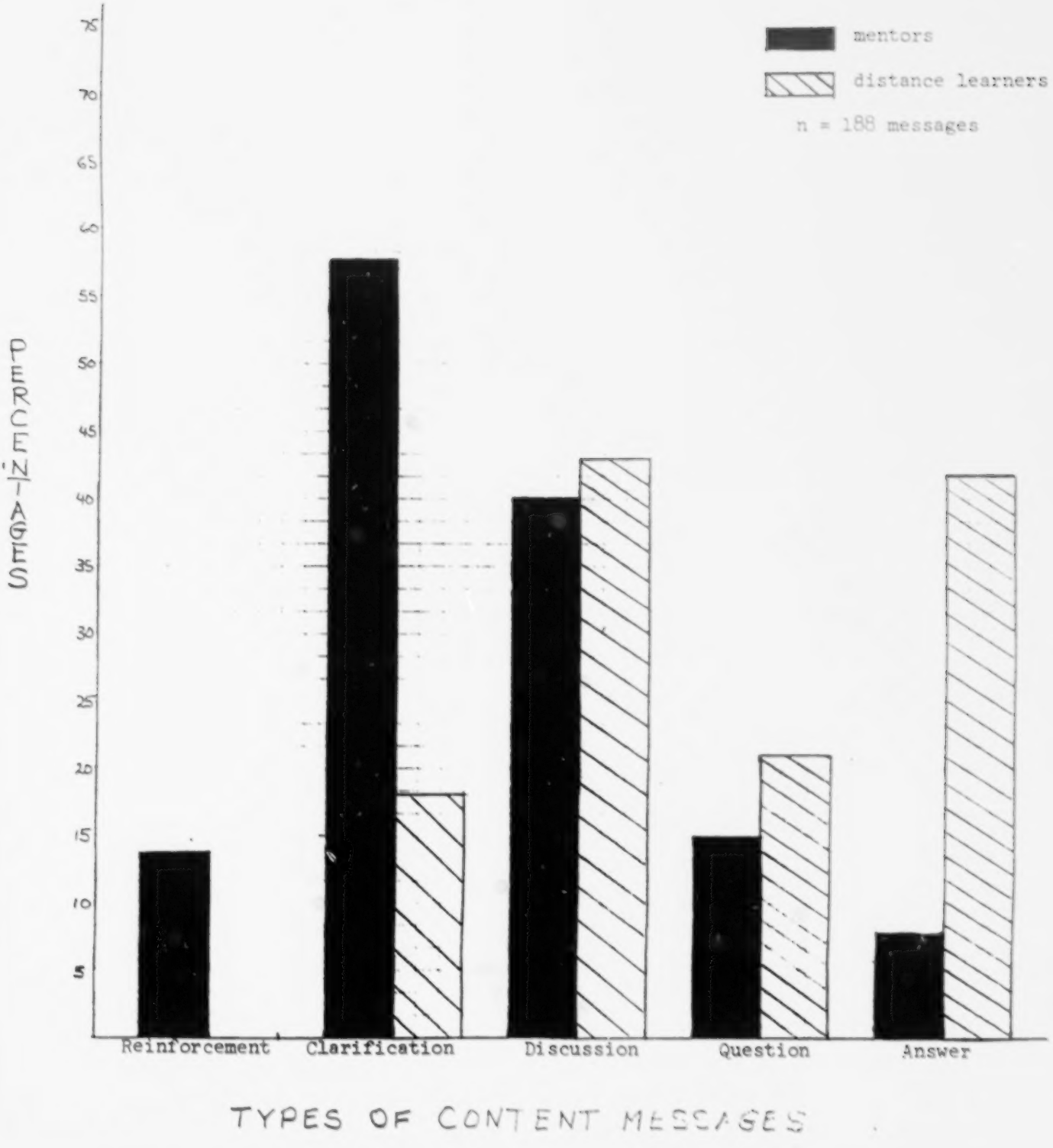

Figure 3: Percentages of Types of Content Messages from Mentors and Students

messages contained higher proportions of question and answer statements. The students and mentors discussed the course content with roughly equal frequency (40% mentor messages and 43% student messages).

RESULTS OF ANALYSIS OF MENTOR BEHAVIORS

The behavioral specifications developed by Peterson (1977, 1979) to describe the teacher behaviors which identify high versus low structure and high versus low participation are powerful enough to direct the differential treatment conditions used by Peterson (1977, 1979) and others (Dowaliby, Curwin, and Quinsland, 1984) in their experimental studies in which significant treatment effects have been found. Here the system is used, not as a mechanism for devising values of an independent variable, but as a way to explore the similarities and differences between teacher behaviors in a variety of settings (9th grade, traditional college, with the deaf) and behaviors of a "mentor" using cc to enhance a distance learning college course. Only mentor messages from Categories 1 (Class Management/Organization) and 4 (Content-Specific) were analyzed using Peterson's behavioral specifications. Table V shows the modifications to Peterson's specifications used in the present study.

Two of the 6 courses showed predominantly high structure/high participation (H/H) mentor behaviors. For 2 courses, the mentor behaviors were predominantly high structure/low participation (H/L). The predominant mentor behaviors for the remaining 2 courses were high structure, but both high and low participation mentor behaviors were frequently found (H/L-H). Table VI shows the final course grades for the students related to the predominant behaviors of their mentors.

TABLE VI

Student Grade	Mentor Behavior
A	H/H
A	H/H
A	H/L-H
B	H/L
Incomplete	H/L
Incomplete	H/L
Incomplete	H/L
Incomplete	H/L-H

TABLE I

Behavioral Specifications for Instructional Treatments Used in the Present Study

Student participation	
High	Low
High Structure	
1. Teacher elicits desired goals/objectives from students by asking questions.	1. Teacher tells desired objectives.
2. Teacher has student give review of previous day's lesson.*	2. Teacher givess review of previous day's lesson.*
3. Teacher uses student ideas or responses to signal transitions.	3. Teacher signals for transitions.
4. Teacher uses student ideas and adds visual markers emphasize important points.+	4. Teacher states important points with visual markers for emphasis.+
5. Teacher asks student(s) to summarize during the lesson.	5. Teacher summarizes during the lesson.
6. Teacher asks many questions and uses questions and student responses to structure lesson.	6. Teacher asks few questions, but uses those few questions and student responses.
7. Teacher tells students they will be required to participate in class and does call on students during class.	7. Teacher tells students they will not be required to participate in class and does not call on students during class.
8. Teacher waits several seconds after student remark to allow time for student comments.#	8. Teacher does not wait after student remark but begins talking again.#
9. Teacher has students read aloud readings.*	9. Teacher reads aloud readings.*

Note. This table is modified from Peterson, 1977, page 782, Table 1.
*Not used in the present study.
+Peterson (1977) employed verbal markers here.
#Used only for analysis of teacher behavior in class with more than 1 student.

DISCUSSION

In practice, cc is providing distance learners with the opportunity to interact with mentors but not, at the moment, with other students. As the volume of students increases and classes can be regularly constructed with more than 1 student, students will be able, theoretically, to become involved in student-to-student exchanges.

The mentors and students use cc in different ways. Mentors spend a good deal of time clarifying the key concepts relevant to their courses. Students spend a good deal of time answering direct questions posed by their mentors. Both students and mentors spend about 40% of their cc time in extended discussions of the course content. There were no examples in the sample studied of electronic lectures.

While Category 4 messages (content-specific) were predominant among both the mentor (53%) and distant learner (59%) messages, they occurred far more frequently among mentors and on-campus independent study students. A previous study (Haile and Richards, 1984) reports that 70% of the student messages were classified as Category 4 for a pilot program of 15 on-campus independent study students enrolled in 2 psychology courses. The same study reports that 75% of the mentor messages were classified as Category 4 in the on-campus independent study program. The proportion of messages in the other categories were similar for the two different programs, with the exception of the number of messages from students in Category 1 where the distance learner appears to have contributed more to the class organization than did the on-campus student.

This difference in proportion of content-specific messages raises a number of questions which need to be further investigated. Only 13% of the distance learners completed their coursework in the 6-month period, while 93% of the on-campus students completed their coursework in the 8-week period established for their program. Is there a relationship between the proportion of content-specific messages sent by the mentor and the speed with which the student completes the coursework? Is the mentor of a distance learner limiting his or her content-specific messages in response to the lower rate of progress on the part of the distance learner? Many confounding variables are also operating which need to be studied, such as prior learning, student employment status, and computer expertise.

The qualitative data collected regarding the relationship between mentor behaviors and completion of cc courses can only be used to further direct thinking about the appropriate role of the mentor in cc courses. From this very small sample and using methods which provide impressionistic information, questions can be raised regarding a positive direct relationship between mentor behaviors which stimulate student participation - behaviors such as using student ideas while adding visual markers to emphasize important points - and the students retention in distance learning programs.

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